



U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

OCT 23 2001

DOT-E 12184
(SECOND REVISION)

EXPIRATION DATE: January 31, 2003

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Weldship Corporation
Bethlehem, PA
2. PURPOSE AND LIMITATION:
 - a. This exemption authorizes the transportation in commerce of certain gases in 9-5/8 inch diameter DOT 3A and DOT 3AA, cylinders. The cylinders are retested by acoustic emission (AE) and ultrasonic examination (UE) described in paragraph 7 below in place of the internal visual inspection and the hydrostatic retest required in § 173.34(e). This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.
 - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.
 - c. Party status will not be granted to this exemption.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.34(e): the introductory paragraph, the Table, and paragraphs (1), (3), (4), and (6); and 173.302(c)(2), (3), and (4) in that the AE and UE are performed in place of the hydrostatic test and the internal visual inspection. This does not relieve the holder of this exemption from securing an approval for retesting cylinders from the Associate Administrator for Hazardous Materials Safety.

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5. BASIS: This exemption is based on the application of Weldship Corporation dated December 15, 2000, submitted in accordance with § 107.105 and the public proceeding thereon.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Materials Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Liquefied or nonliquefied compressed gases, or mixtures of such compressed gases, classed as Division 2.1, Division 2.2, or Division 2.3 which are authorized for transportation in DOT 3A and DOT 3AA cylinders.	Specific hazard class and division applicable to the compressed gas or gas mixture to be shipped	As listed in § 172.101 for the specific compressed gas or gas mixture	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packagings are DOT 3A or DOT 3AA cylinders, mounted on a tube trailer vehicle chassis, a tube module equipped with an ISO frame, or in a disassembled position. Each cylinder must have a nominal diameter of 9-5/8 inch and a minimum water capacity of 140 liters (36.9 U.S. gallons). The minimum wall thickness of DOT 3A cylinders may not be less than 0.280 inch and the minimum wall thickness of DOT 3AA cylinders may not be less than 0.225 inch. This exemption applies to DOT 3A and DOT 3AA tubes with a marked service pressure of 2,400 psig or greater and does not include portable cylinders. In lieu of the hydrostatic test and internal visual inspection prescribed in § 173.34(e), each cylinder must be examined by the AE and UE. A cylinder that has been exposed to fire or to excessive heat (temperatures of 1000°F. or greater) must not be retested under the terms of this exemption. Each cylinder must be retested and marked in accordance with the procedures specified in the Weldship Corporation application for exemption dated November 11, 1998, March 11, 1999 and December 15, 2000 on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA) and as prescribed in this exemption.

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b. TESTING -

(1) AE Examination Procedure and Equipment - The AE examination procedure and equipment described in Weldship's application must meet examination procedure and apparatus requirements prescribed in American Society for Testing and Materials (ASTM), E 1419-96 except as specifically stated herein:

(i) For system performance pencil lead break or electronic pulsar may be used. Lead break or electronic pulsation must be on the cylinder surface at a minimum distance of 4-inches (100 mm) from each sensor. The AE signal for each sensor during performance check must have a sensitivity equal or greater than 70 dBV.

(ii) Areas of cylindrical portion of each cylinder examine by AE method having five or more AE events that occur within 8 in. (203 mm) axial distance, must be marked for the follow-up UE.

(2) UE Equipment performance - Ultrasonic pulse-echo instrumentation shall have a minimum capacity of examining at center frequencies from 2 1/4 to 5 MHz. The instrument, search units and related equipment shall be cable of displaying the peak amplitude of the indication from the reference notch in the standardization ring, and locating its circumferential position over the full sweep range required for coverage of the vessel to be examined.

(i) Each search unit used for this technique shall have the appropriate frequency and refracted angle for the material and geometry of the cylinder that is being examined. The frequency and angle of the search unit is selected during standardization and is related to diameter, wall thickness and the type of steel used for the vessel and corresponding standardization rings.

(ii) The angle and frequency of the search unit to be used shall be determined by using different search units on a reference ring that represents the test piece.

A search unit which can satisfactorily detect and display the indication from the notch the reference ring at the maximum distance to be used during the examination shall be selected for setting up the Distance Amplitude Correction (DAC) curve for examining.

(iii) Select search units for evaluation from those having frequencies of 2, 3 and 5 MHz, refracted angles of 45° to 60° in steel, and in available commercial sizes. Those producing the required sensitivity and DAC respond on the appropriate reference ring are acceptable.

(iv) The search unit shall comprise a transducer mounted on a plastic wedge that is designed to have continuous acoustic coupling between search unit and the cylinder wall.

(3) Couplant - Couplant for this practice shall be a liquid that is used between the ultrasonic search unit and test piece to remove the air and transmit ultrasonic waves. Water is a preferred couplant. Other couplants such as oil or glycerin may be used. Couplant shall be the same for both standardization and actual testing.

(4) UE Standardization Ring With Reference Notches (Reference Ring) - The reference ring shall be fabricated from the same type of cylinder that is being examined. The reference ring must have the same diameter, minimum design wall thickness with a tolerances of +/- 10%, material, heat treatment, and surface condition as the cylinder to be examined. Reference notches will be placed into both internal and external surfaces of the reference ring. Notches shall be made by EDM process. One or more notches may be placed into a single reference ring. Each circumferential notch must have a depth of less than or equal to 25 percent of t_m or 0.060 in. (1.53 mm), a width of less than or equal to 0.020 in. (0.5 mm), and a length of 1 in. (25.4 mm).

(5) UE Standardization Procedure - The instrument sweep shall be adjusted to encompass the sound path to be used during the examination.

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(i) Place the search unit on the outside surface of the reference ring and adjust the gain and location of the search unit until the indication from the internal notch is identified.

(ii) Place the shear wave search unit at a close distance (half-skip distance) from a designated reference notch on the internal surface of the reference ring. Increase the gain until the indicated signal is maximized at 80% of the screen height.

(iii) Without changing the sensitivity control, obtain three additional indications at 90°, 120° and 180° degree positions around the ring's circumference by moving the search unit on the ring, away from the reference notch (internal or external). It may be necessary to increase the gain and horizontal display range control on the instrument.

(iv) Mark the maximum peak of each indication on the display screen. Identify the Distance Amplitude Correction (DAC) curve by connecting the peaks. The same procedure will be used to generate DAC curve for the external notch. If the UE system is equipped with a DAC curve program, marking of DAC curves on the screen is not applicable.

(v) To obtain UE standardization for the external notch, procedure 7.b.(5)(i)-(iv) must be repeated.

(6) UE Procedure - Prior to ultrasonic examination, each AE indication must be clearly marked. A minimum of 6-inch of surface shall be scanned at each side of the marked location. Prior to scanning the gain shall be increased by 6dB to increase sensitivity. Prior to evaluating, estimating and reporting the flaw, gain must be returned to the same value used during standardization.

(i) Circumferential scanning shall be performed in both clockwise (CW) and counter clockwise (CCW) directions to ensure adequate coverage of the marked location.

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(ii) For difficult to reach locations on cylinders that are stacked in the middle rows, the search unit may be mounted at the end of an extension rod. If an extension rod is used for testing, standardization must be under the same condition as examination.

(iii) The DAC curve must be used as a threshold for acceptance/rejection of a flaw's depth by determining the amplitude of the reflected signal from the flaw as a percentage of the DAC curve. Any detected flaw with amplitude that exceeds the DAC curve (gate) should be considered a potential for rejection. After the flaw has been located, it shall be reexamined by scanning from several directions utilizing the first half-skip distance to confirm that the maximum signal amplitude from the flaw is above the DAC curve. To achieve maximum signal amplitude, circumferential scanning may be combined with a slow twisting motion to detect the part of the discontinuity that may not be oriented completely perpendicular to the incoming ultrasonic pulse. The cylinder containing the flaw may require removal from the stack to allow access to the flaw location.

(iv) When a removal of a cylinder from service is considered, another examination technique such as reflected tip diffraction may be used to accurately evaluate the flaw (depth, length and orientation).

(7) Rejection criteria - rejection criteria as established by fracture mechanics for the cylinder retested under this exemption is a flaw with a maximum depth less than or equal to 25% of the minimum design wall thickness or any crack with a maximum depth of 0.060 in. (1.53 mm). When a cylinder is rejected, the retester must stamp a series of X's over the exemption or DOT specification number and marked test pressure, or stamp "CONDEMNED" on the shoulder, or neck using a steel stamp, and must notify the cylinder owner, in writing, that the cylinder is rejected and may not be filled with hazardous material for transportation in commerce. Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure.

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c. MARKING -

(1) The exterior of the trailer cabinet of the vehicle chassis to which the cylinders are affixed must be marked with letters at least 2 inches high on a contrasting background "DOT-E 12184".

(2) An exterior tube on each side of a tube module must be marked with letters at least 2 inches high on a contrasting background "DOT-E 12184".

(3) The current retest date must be marked on the rear bulkhead inside the trailer cabinet at approximately eye level above the withdrawal valve for tube trailers and on the bulkhead near the withdrawal valve for tube modules. In the event retest dates of cylinders differ in a trailer cluster, the retest date displayed will be that of the oldest retest date, meaning the date of the retest that must occur first.

d. Report - A report must be generated for each cylinder that is examined. The AE and UE reports must include the following:

- (1) AE and UE equipment, model and serial No.
- (2) Specification of the standard reference used to UE the cylinder. Standard reference (calibration ring) must be identified by serial number or other stamped identification marking.
- (3) Cylinder serial number and type.
- (4) Maximum allowable filling pressure.
- (5) Minimum prescribed sidewall.
- (6) Number of events at each location.
- (7) Pressure associated with each event.
- (8) Description of each AE event (amplitude, duration, energy, etc.)
- (9) Size of each defect measured (length and depth).
- (10) Type of each defect measured (crack, pitting, etc.)
- (11) Defect location relative to each sensor.
- (12) Defect angular location defined by clock direction (3, 5, or 9 O'clock)
- (13) Defect location relative to sidewall (interior, outer surface, inner surface).
- (14) AE and UE technicians' name and certification level
- (15) Test Date

- (16) Acceptance/rejection results.
- (17) The AE and UE reports must be on file at the test site, and made available to a DOT official when requested.

e. Personnel Qualification: Each person who performs retesting or who evaluates or certifies retest results must meet the following requirements:

- (1) Project Manager - is the senior manager of Weldship responsible for compliance with DOT regulations including this exemption. Additionally, the project manager must ensure that each operator and senior review technologist maintain the required certification.
- (2) The personnel responsible for performing cylinder retesting under this exemption shall be qualified to an appropriate Level (Level I, II or III)- AE and UE in accordance with the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A-1996 depending upon the assigned responsibility as described below:
 - (i) A Level II Operator may perform system startup, calibrate the system, and review and certify the test results when a written acceptance and rejection criteria for cylinders have been provided by a Senior Review Technologist. Based upon written criteria, the Level II Operator may authorize cylinders that pass the retest to be marked in accordance with paragraph 7(e) of this exemption. However, a person with Level I certification may perform a system startup, check calibration, and perform AE and UE under the direct guidance and supervision of a Senior Review Technologist or a Level II Operator, either of whom must be physically present at the test site so as to be able to observe examination conducted under this exemption.
 - (ii) Senior Review Technologist (SRT) - is a person who reviews overall test results, provides supervisory training and technical guidance to operators, and reviews and verifies the retest results. A SRT must have a Level III Certification in AE and UE, and a thorough understanding of the HMR pertaining to the re-qualification and reuse of the DOT cylinders

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authorized under this exemption. The SRT must prepare and submit the reports required in paragraph 7(f) and annually verify that the AE and UE program is being operated in accordance with the requirements of this exemption.

f. OPERATIONAL CONTROLS.

(1) No person may perform inspection and testing of cylinders subject to this exemption unless:

(i) that person is an employee or agent of Weldship and has a current copy of this exemption at the location of such inspection and testing, and

(ii) complies with all the terms and conditions of this exemption.

(2) The marking of the retester's symbol on the cylinders certifies compliance with all of the terms and conditions of this exemption.

(3) Each facility approved by OHMEA to test cylinders under the terms of this exemption must have a resident operator with at least a Level II Certification in AE and UE.

8. SPECIAL PROVISIONS:

a. Offerors may use the cylinders specified in tested in accordance with the provisions of this exemption for the transportation in commerce of those hazardous materials specified herein, provided no modifications or changes are made to the cylinders, and all terms of this exemption are complied with.

b. Shippers using the cylinders covered by this exemption must comply with the provisions of this exemption, and all other applicable requirements contained in 49 CFR Parts 100-180.

c. A person who is not a holder of this exemption who receives a package covered by this exemption may reoffer it for transportation provided no modifications or changes are made to the package and it is reoffered for transportation in conformance with this exemption and the HMR.

d. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

e. Cylinders retested in accordance with paragraph 7 above may be charged to 110 percent of marked service pressure in accordance with § 173.302(c).

f. A statement of qualifications, for each "qualified tester" used under this exemption and information in support thereof, must be maintained by Weldship. The location of this statement, for each "qualified tester", must be identified to the OHMEA.

g. Transportation of Division 2.1 (flammable gases) and Division 2.3 (gases which are poisonous by inhalation) are not authorized aboard cargo vessel unless specifically authorized in the Hazardous Materials Table (§ 172.101).

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle and cargo vessel.
10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel used to transport packages covered by this exemption.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
 - o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
 - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

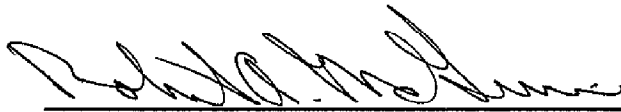
No person may use or apply this exemption, including display of its number, when this exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The following information must be reported to OHMEA:

- a. The name of each person qualified to conduct testing under Paragraph 7.c., before use as a "qualified tester".
- b. Location of each facility where testing under this exemption is conducted.
- c. A report on the first test and a report each 6 months thereafter indicating the number of cylinders tested under this exemption and identification by serial number of those passing and those failing to pass the test authorized by this exemption. Specifically, each report must include at least the following information:
 - (1) DOT specification number.
 - (2) Maximum allowable filling pressure.
 - (3) Minimum prescribed sidewall.
 - (4) Number of events at each location.
 - (5) Pressure associated with each event.
 - (6) Description of each AE event (amplitude, duration, energy, etc.)
 - (7) Size of each defect measured (length and depth).
 - (8) Type of each defect measured (crack, pitting, etc.).
 - (9) Defect location relative to each sensor.
 - (10) Defect location relative to sidewall (interior, outer surface, inner surface).

d. The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued in Washington, D.C.:



Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

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(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, S.W., Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

PO: MMToughiry